

REMARKS

All the claims currently in this application have been rejected on formal and substantive grounds. Applicants have amended their claims and respectfully submit that all the claims currently in this application are patentable over the rejection of record.

Two formal grounds of rejection are imposed in the outstanding Official Action. The first, directed to all the claims submitted for examination, Claims 1-43, stand rejected, under 35 U.S.C. §112, second paragraph, as being indefinite.

Specifically, the term “weak,” used in many of the claims, renders the claims indefinite. The term “weak” is not defined by the claims and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Similarly, the term “strong,” as it appears in Claim 9, is also a relative term which renders the claims indefinite. To remedy these alleged failings, the Official Action suggests that the pH of the acid cation exchange resin be set forth.

Applicants respectfully traverse this ground of rejection. Those skilled in the solution separation arts are aware of the meanings of “weak” or “strong” acid cation exchange resins used for chromatographic separation.

It is well established that, in determining indefiniteness, the claim language must be read in the light of the prior art and the teachings of the specification. In re Merat, 519 F.2d 1390, 186 USPQ 471 (CCPA 1975); In re Moore, 439 F.2d 1232, 169 USPQ 236 (CCPA 1971); In re Cohn, 438 F.2d 989, 169 USPQ 95 (CCPA 1971). The Board of Patent Appeals and Interferences provides the clearest measuring rod. They have held that the definitiveness of language employed in a claim must not be analyzed in a vacuum. Rather, that analysis must always be made in light of the teachings of the prior art and the particular application

disclosure as it would be interpreted by one having ordinary skill in the pertinent art. Ex parte Moelands, 3 USPQ2d 1474, 1476 (Bd. App. & Int'l 1987).

So it is in the present application. The terms "weak" and "strong," to denote acid cation exchange resins used for chromatographic separation, have always denoted in the solution separation art by these terms. To further restrict these meanings would, in fact, make indefinite that which those skilled in the art appreciate to be definitive.

Applicants turn to the principal applied reference, U.S. Patent 4,359,430 to Heikkilä et al., wherein the term "strong," referring to the cation exchanger is recited, e.g. Column 1, line 41 and Column 2, line 40. Other references directed to this art, such as U.S. Patent 5,998,607 to Heikkilä et al., which has been made of record in the file of the present application, pursuant to the filing of an Information Disclosure Statement, also uses the term "strong" in referring to cation exchange resins, e.g. Column 4, line 31, as well as many other places in the patent. Similar examples directed to "weak" cation exchange resins employed in chromatographic separation of solutions are also readily identified. Applicants can, if requested, supply references which further emphasize the well known nature in the art of these terms in designating exchange resins.

In view of the above remarks, reconsideration and removal of the rejection of all the claims submitted for examination, based on the use of the terms "strong" and "weak," is deemed appropriate. Such action is respectfully urged.

The second formal ground of rejection is directed to Claim 20. Claim 20 stands rejected, under 35 U.S.C. §112, second paragraph, as being indefinite.

The basis for this ground of rejection is that Claim 20 recites "a concentration or filtration unit ... arranged between chromatographic columns." Claim 1, from which Claim

20 depends, makes no mention of multiple chromatographic columns. As such, there is no antecedent basis for this phrase in Claim 20.

Applicants agree that this ground of rejection has merit. Thus, in accordance with the suggestion made in the outstanding Official Action, applicants have changed the dependency of Claim 20 from Claim 1 to Claim 17. Indeed, the Official Action indicates that changing the dependency of Claim 20 from Claim 1 to Claim 17 overcomes this ground of indefiniteness. Applicants have additionally amended Claim 20 to indicate that the concentration or filtration unit is arranged between the first and second chromatographic columns.

In this regard, applicants have added two new claims, new Claims 44 and 45. New Claims 44 and 45, which depend from Claims 18 and 19, respectively, each recite that a concentration or filtration unit is arranged between chromatographic columns. New Claim 44 states the chromatographic columns to be the first and second columns, providing the requisite antecedent basis from Claim 18. Claim 19 sets forth that a concentration or filtration unit is arranged between chromatographic columns.

It is also noted that Claims 21 and 22 have been amended, as in Claim 20, to identify the chromatographic column and thus provide better antecedent basis for these dependent claims. Finally, Claim 11 has been amended to conform its language to proper Markush group claim recitation. It is emphasized that none of these amendments add any new matter to the application.

The sole substantive ground of rejection imposed in the outstanding Official Action is directed to all the claims submitted for examination, Claims 1-43. Claims 1-43 stand rejected,

under 35 U.S.C. §103(a), as being unpatentable over Heikkilä et al. ('430) in view of Chinese Patent Publication 1234404A to Qui et al.

The Official Action, in imposing this ground of rejection, argues that the claims of the present application are drawn to a method of separating sugars and non-sugars from a solution comprising passing the solution through at least one weak acid cation exchange column and at least one strong acid cation exchange column wherein the resin is in the form of a salt and is crosslinked with divinyl benzene wherein the crosslinking degree of the resin is 3% to 8% by weight and the particle size of the resin is 10 to 2,000 microns.

The Official Action states that Heikkilä et al. ('430) discloses a process of separating betaine from sugars and non-sugars of beet molasses by a chromatographic process. The chromatographic process disclosed in Heikkilä et al. ('430) includes a column containing a strong cation exchange resin in alkali form wherein sodium is generally the preferred alkali form and the elution material is generally water at 60°C to 90°C.

It is unnecessary to repeat all the aspects of the invention of Heikkilä et al. ('430) summarized in the outstanding Official Action. Suffice it to say, the Official Action admits that the critical use of a weak acid ion exchange column is not disclosed or suggested by Heikkilä et al. ('430).

It is for this reason that the secondary Qui et al. disclosure is applied. The Official Action avers that Qui et al. teaches a method of separating ribose from fermentation liquor from a strong acid cation exchange resin column, a weak base anion exchange resin column and a weak acid cation exchange resin column. As such, the Official Action concludes that it would be obvious to one of skill in the art to use a multi-column chromatography process with at least one weak cation exchange resin to separate sugars and nonsugars from a solution of

divergent products are known in the art to be obtained, at various pHs in chromatographic columns, because of their different properties and reactivity kinetics.

The reason why this ground of rejection does not make obvious Claim 1, the broadest claim presently in this application, is because Claim 1 is directed to a multistep process for recovering one or more products from a solution containing one or more components of a class of materials by chromatographic separation which includes at least one step where a weak acid cation exchange is used for the chromatographic separation. (Emphasis added).

The Official Action admits that the principal reference, Heikkilä et al. ('430), is deficient insofar as the chromatographic separation requires the use of a weak acid cation exchange resin in this chromatographic separation. The Official Action implicitly admits that Heikkilä et al. ('430) does not so much as employ such an exchange resin.

To overcome this critical deficiency in Heikkilä et al. ('430), the secondary Qui et al. reference is applied. Qui et al. is directed to a method of separating a sugar, D-ribose, from a fermented liquor. Although the separation of D-ribose is in accord with the separation of some of the members of the Markush group of components within the contemplation of Claim 1, the Qui et al. reference is critically deficient insofar as the method employed to separate D-ribose involves three different kinds of ion exchange resins. (Emphasis added).

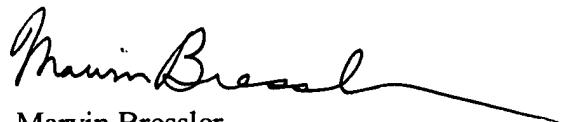
Those skilled in the art are aware of the clear line of distinction between separation of sugars utilizing ion exchange methods and chromatographic methods. An ion exchange method, such as that disclosed in Qui et al., does not separate a sugar, e.g. D-ribose, into different fractions of the sugar or other components. The method taught by Qui et al., as set forth in the Abstract, merely collects D-ribose from an effluent. This, of course, is the major distinction between ion exchange and chromatographic separations.

The claimed method of the present application, recovers one or more products from a solution containing one or more components. Such a separation can only occur utilizing chromatographic separation. Such a separation cannot occur utilizing an ion exchange resin. An ion exchange separation merely separates the component.

In summary, it is abundantly clear that Qui et al. does not disclose or suggest the use of a weak acid cation exchange resin for chromatographic separation. As such, the Official Action admitted patentability of the method claimed in the present application over Heikkilä ('430) is undisturbed by the supplementation of its teaching by Qui et al. Reconsideration and removal of this ground of rejection is deemed appropriate. Such action is respectfully urged.

The above amendment and remarks establish the patentable nature of all the claims currently in this application. Notice of Allowance and passage to issue of these claims, Claims 1-45, is therefore respectfully solicited.

Respectfully submitted,


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